

46.2312  
AUTHOR:

33106  
S/638/61/001/000/032/056  
B116/B102  
Arifov, U. A.

TITLE:

Charge, mass, and energy balances for the collision of slow ions with atoms of solids

SOURCE:

Tashkentskaya konferentsiya po mirnomy ispol'zovaniyu atomnoy energii. Tashkent, 1959. Trudy. v. 1. Tashkent. 1961, 210-222

TEXT: The author presents an inertialess, osciloscopic technique developed by the collective of the otdel yadernoy elektroniki Instituta yadernoy fiziki AN UzSSR (Department of Nuclear Electronics of the Institute of Nuclear Physics, AS Uzbekskaya SSR) for investigating secondary effects (Arifov, U. A., Ayukhanov, A. Kh., Starodubtsev, S. V., DAN UzSSR. 1953, 4, 12, ZhETF, 1954, 26, 714). The technique allows for the essential characteristics of secondary effects during collision, and permits qualitative and quantitative analyses of the processes taking place during the collision of ions with atoms of the target. In addition, it can be used to set up the charge, mass and energy balances of ions colliding with

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Charge, mass, and energy ...

the atoms of solids and to calculate the accommodation coefficient of the ion beam. In the new technique, the initial ion beam is focused onto the condenser where it is purified from neutral atoms. Its intensity is modulated by a square-pulse generator of 500-1000 cps. The secondary emission current from the target is gathered by a collector whose potential relative to the target is modulated by sawtooth pulses of 25 cps. The volt-ampere characteristic of the secondary currents appears on the screen of the oscilloscope. Oscillograms recorded during the bombardment of a tungsten target with 300-ev Rb ions show that intense secondary-electron emission at low temperatures is not a characteristic feature of pure metals but is caused by the impurity formed on the pure metal surface owing to the partial adsorption of the initial ion beam, and by the residual gases from the vacuum. Oscillograms recorded at room temperature, at  $\sim 1100^\circ\text{K}$ , and at  $\sim 1350^\circ\text{K}$  indicate that at high temperatures of the target and for  $V_i < \varphi$  ( $V_i$  = ion-charge potential,  $\varphi$  = work function of the target) the secondary ions contain scattered ions of the initial beam and ions produced by surface ionization of the adsorbed atoms. At high temperatures of the target, even ions with an extraordinarily long lifetime evaporate

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S/638/61/001/000/032/056  
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Charge, mass, and energy ...

if the energy of the initial ions is high enough, if the target temperature is above  $1000^{\circ}\text{K}$ , and if the charge potential of the incident ions is less than the work function of the target. Under these conditions, the secondary emission current contains a third component, namely, secondary ions produced by the diffusion and surface evaporation of the initial ions that have penetrated deep into the target. A study of the charge and mass balances has shown that, if the ion mass  $m_2$  is less than the target mass  $m_1$ , if  $T \leq 1200^{\circ}\text{K}$ , and if  $V_1 > \varphi$ , then some of the ions of the initial beam will be scattered by the individual atoms of the target, and the rest will be neutralized. If  $T > 1200^{\circ}\text{K}$ ,  $V_1 < \varphi$ , and  $m_1 > m_2$ , some of these ions will be scattered elastically, while others will leave the target in the form of evaporated and diffusion evaporated ions. The rest will be neutralized. The new technique thus permits the setup of charge and mass balances. There are 9 figures, 2 tables, and 7 Soviet references.

ASSOCIATION: Institut yadernoy fiziki AN UzSSR (Institute of Nuclear Physics AS Uzbekskaya SSR)

Card 3/3

X

ARIFOV, U.A., akademik; INADENIOMAD D.V., Kh.Kh.; SCHOLYV, A.P.

Evolution of the scattering of X-rays.

Izv. Akad. SSR. Ser. fiz.-mat.nauk no. 5:56-61 '61.

(LIT. 14:10)

(Alkalies)

(Ions--Scattering)

ARIFOV, U.A., akademik; KHADEZHIMUKHAMEDOV, Kh.Kh.

Scattering of alkali ions on metal surfaces. Izv. AN Uz.  
SSR. Ser. fiz.-mat.nauk no.5:65-67 '61. (MIR 14:10)

1. Akademiya nauk UzSSR.  
(Alkalies) (Ions—Scattering)

3 062  
S/166/61/000/006/003/010  
B102/B138

26.2312

AUTHOR: Arifov, U. A., Academician AS Uzbekskaya SSR, Ayukhanov, A.Kh.

TITLE: The nature of secondary emission arising when alkaline coatings of metals are bombarded with alkaline ions

PERIODICAL: Akademiya nauk Uzbekskoy SSR. Izvestiya. Seriya fiziko-matematicheskikh nauk, no. 6, 1961, 34 - 39

TEXT: The charge and composition of secondary emission from tantalum and tungsten bombarded with alkaline ions were studied in dependence on the steadily increasing alkaline coating, its composition, and the rate of deposition. Standard experimental technique was used. The electrons were separated from the negative ions by a magnetic field of 400 oe. The pressure in the apparatus was  $10^{-6}$  mm Hg. Measurements at rates of deposition showed that the negative component of the secondary emission was relatively high and increased with the density of the film. At higher rates (~20 monatomic layers per sec) the secondary emission of negative ions increased rapidly with density, reaching a maximum after about 2 sec, then falling, almost to the initial value. Ion-induced

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26.2312

AUTHOR: Arifov, U. A., Academician AS Uzbekskaya SSR, Khadzhimukhamedov,  
Kh. Kh., Sokolov, A. P.

TITLE: Thermal back-emission of K, Rb and Cs ions from Mo and Ti  
targets

PERIODICAL: Akademiya nauk Uzbekskoy SSR. Izvestiya. Seriya fiziko-  
matematicheskikh nauk, no. 6, 1961, 40 - 43

TEXT: When metals are bombarded by alkaline ions, some are scattered and  
penetrate the metal. If the temperature is high enough ( $T > 1200^{\circ}\text{K}$ ) these  
ions will diffuse toward the surface. Depending on the ratio between the  
work function of the metal and the ionization potential of the alkaline  
atom, part of these ions will evaporate as neutral atoms and the other  
part as positive ions. The latter are called "diffusional ions". The  
ion back-emission corresponds to cathode sputtering, that of diffusional  
ions to thermodiffusion. The authors measured the emission coefficient

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Thermal back-emission of K, Rb and Cs ions...

$K_d$  of diffusional ions, i.e. the ratio between ion diffusion current and primary ion current, in dependence on the nature of the ions (K, Rb and Cs) and on the target material (Mo and Ti), in the energy range  $E_o = 140-1600$  ev at a target temperature of  $1500^\circ K$ . The experimental arrangement has been described in (Arifov et al. ZhETF, 1954, 26, 714).  $K_d$  as a function of  $E_o$  is shown in Figs. 2 and 3. In all cases  $K_d$  increases with energy, tending to saturation above 1000 ev. At  $E_o > 600$  ev, the higher the mass and the lower the ionization potential of the ion, the greater is the  $K_d$  value, while below 600 ev the inverse relations hold. The ionization potential is not only inversely proportional to ion mass and ion radius, but also to the number of diffusing ions. At 600 ev the Cs ions have the highest and the K ions the lowest  $K_d$  value. The penetration of alkaline ions into a metal, and their back-diffusion to the surface, depends in a complex manner on mass, radius, energy and

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Thermal back-emission of K, Rb and Cs ions...

ionization potential of the primary ions, on the mass of the target atoms and finally on the crystal structure of the target. There are 3 figures and 8 references: 5 Soviet and 3 non-Soviet. The three references to English-language publications read as follows: Varnerin I. J. a. Carmichael J. H. J. Appl. Phys, 1957, 28, 913. Carmichael J. H., Trendelenburg E. A. J. Appl. Phys., 1958, 29, 1570. Phelps A. V. (private communication) J. Appl. Phys., 1958, 29, 1576. ✓

ASSOCIATION: Akademiya nauk UzSSR (Academy of Sciences Uzbekskaya SSR)

SUBMITTED: July 26, 1961

Card 3/3

ARIFOV, U.A., akademik; KHADZHIMUKHAMEDOV, Kh.Kh.; SOKOLOV, A.P.; KARIMOVA, M.

Thermionic secondary emission of alkali ions injected in targets  
of different densities. Izv. AN Uz. SSR. fiz.-mat. nauk no.6:  
44-46 '61. (MIRA 16:12)

1. Akademiya nauk UzSSR.

31064

S/166/61/000/006/005/010  
B102/B138

26.2312

AUTHOR: Arifov, U. A., Academician AS Uzbekskaya SSR, Khadzhimukhamedov, Kh. Kh.

TITLE: Scattering of alkaline ions on metal surfaces at high temperature

PERIODICAL: Akademiya nauk Uzbekskoy SSR. Izvestiya. Seriya fiziko-matematicheskikh nauk, no. 6, 1961, 47 - 49

TEXT: The authors have measured the scattering coefficients  $K_p$  of positive Li, Na, K, Pb and Cs ions scattered from Mo, Ta, and Ni targets at 1500°K in the energy range  $E_0 = 180 - 1600$  ev. Method and apparatus have been described earlier (Arifov et al. Izv. AN UzSSR, ser. fiz.-mat. nauk, 1961, No.5). The targets, 0.02 mm thick plates, were purified by high-temperature treatment for several days and were heated again before each measurement. The primary and secondary currents were recorded by oscillograph. The results are shown in Figs. 2-4. Unlike the cold

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Scattering of alkaline ions on metal...

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target experiments, with hot targets ( $1500^{\circ}\text{K}$ ) no ion scattering was observed, within the limits of error, when  $m_2 > m_1$ . If  $m_2 < m_1$ ,  $K_p$  at  $1500^{\circ}\text{K}$  is less than at  $300^{\circ}\text{K}$ .  $m_2$  is the ion mass,  $m_1$  the mass of the target atoms. Whereas, with the cold targets, the  $K_p(E_0)$  curves intersect with hot targets they run almost in parallel. For  $E = 0.8 \text{ kev}$ , the  $K_p$  values are in good agreement with the relation  $K_p = \frac{0.8}{3}(1 - m_2/m_1)$ . The results agree with the law of elastic particle collision. There are 4 figures and 9 references: 8 Soviet and 1 non-Soviet. ✓

ASSOCIATION: Akademiya nauk UzSSR (Academy of Sciences Uzbekskaya SSR)

SUBMITTED: August 16, 1961

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31065

S/166/61/000/006/006/010

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26.2312

AUTHOR: Arifov, U. A., Academician AS Uzbekskaya SSR,  
Khadzhimukhamedov, Kh. Kh., Parilis, E. S., Kishinevskiy, L. M.

TITLE: Scattering of ions on metal surfaces

PERIODICAL: Akademiya nauk Uzbekskoy SSR. Izvestiya. Seriya fiziko-  
matematicheskikh nauk, no. 6, 1961, 50 - 56

TEXT: Experimental results of scattering of alkaline ions from hot and cold metal targets are discussed and compared with theoretical considerations. The aim of the investigations was to explain the sudden increase in the ion scattering coefficient on reduction of the ion energy  $E_0$  from 1-15 kev to some hundred ev. The scattering coefficient  $K_s$  is defined as the ratio between scattered and primary ion current. The  $K_s(E_0)$  curves were plotted in the  $E_0$ -range 75-1600 ev at  $T = 300^\circ\text{K}$  for Na and K scattering from Mo, Na from W, Mo and Ni and Cs from Mo. In all cases  $K_s$

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# Scattering of ions on metal surfaces

increased rapidly with diminishing  $E_0$  and increasing mass of the target atoms. At  $E_0 > 800$  ev  $K_s$  increased with ion mass. At high temperatures ( $T=1500^\circ K$ ) Mo targets were bombarded with Na, K, Rb and Cs ions.  $K_s$  fell with increasing  $E_0$  and ion mass. For Cs ions no fast scattering was observed. The lack of Cs ion scattering at high temperatures means that Cs ion scattering on a cold Mo target must be due to the film of adsorbed heavy atoms which evaporate at high temperatures. The coefficient of ion scattering from metal surfaces can be estimated from the relation  $K_s = \sigma_0 N \lambda_e$ ,  $\sigma_0$  being the elastic forward scattering cross section,  $N$  the number of target atoms per  $cm^3$ ,  $\lambda_e$  the effective depth of back-scattering.  $\sigma_0 = \pi p_0^2$ . The collision parameter  $p_0$  is found from

$$\int_0^\infty \frac{p_0 dr}{r^2 \sqrt{1 - \frac{U(r)}{E_0} - \left(\frac{p_0}{r}\right)^2}} = \frac{\pi - \arccos\left(-\frac{m_2}{m_1}\right)}{2}. \quad (5)$$

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26.23/2  
AUTHORS: Arifov, U. A., Academician AS Uzbekskaya SSR, Ayukhanov, A. Kh., Aliyev, A. A.

TITLE: The angular distribution of alkaline ions scattered from a metal surface

PERIODICAL: Akademiya nauk Uzbekskoy SSR. Izvestiya. Seriya fiziko-matematicheskikh nauk, no. 6, 1961, 57-64

TEXT: After an introductory discussion of the results of own and other previous papers, the authors give a detailed description of the apparatus and procedure. The electrical measurements were based on an oscilloscopic method with double modulation. The primary ion beam, modulated in square pulses, was focused on the target, a 0.02 mm thick Ta or Mo plate. The target was encompassed by a cylindrical collector shielded against parasitic currents. Between target and collector wall a movable probe was installed, for measuring the secondary-ion intensities. The targets were purified by rapid heating up to  $2400^{\circ}\text{K}$ , the measurements were made at

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The angular distribution of alkaline ...

1350°K and a pressure of  $(2-3)10^{-6}$  mm Hg. The target was bombarded by Na ions with energies between 300 and 1700 ev. The number of scattered ions was found to be inversely proportional to the ion energy, and the angular distribution was independent of energy. Angular distributions of the intensity of scattered ions did not depend on target temperature


(300 - 1500°K). Angular distribution was also almost independent of the angle of incidence of the primary ion beam. The coefficient of secondary emission increased with the angle of incidence  $\theta$ . If the mass  $m_2$  of the bombarding ion is less than that ( $m_1$ ) of the target atom, the angular

distribution of the scattered ions will be almost a cosine- $\theta$  curve. The cosine- $\theta$  shaped distribution is independent of the angle of incidence. M. A. Yermeyev and M. V. Zubchaninov (ZhETF, 1942, No. 12, 358) are mentioned. There are 6 figures and 16 references; 6 Soviet and 10 non-Soviet. The four most recent references to English-language publications read as follows: Langacre A. Phys. Rev. 1934, 46, 407; Massey H. S., Smith G. Proc. Roy. Soc., 1933, 16, 570; Rouse O. Phys. Rev., 1937, 52, 1238; Amdur J, Pedrelman, J. Chem. phys, 1940, 8, 7; 1943, 11, 57.

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The angular distribution of alkaline ... 31066  
S/166/61/000/006/007/010  
B102/B138  
ASSOCIATION: Akademiya nauk UzSSR (Academy of Sciences Uzbekskaya SSR)  
SUBMITTED: July 26, 1961



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S/194/62/000/005/123/157  
D230/D308 17

26.23/2  
AUTHORS:

Arifov, U.A., Flyants, N.N., and Ayukhanov, A.Kh.

TITLE:

Some properties of secondary ion-neutral emission

PERIODICAL:

Referativnyy zhurnal. Avtomatika i radioelektronika,  
no. 5, 1962, 46, abstract 5zh310 (Dokl. AN UzSSR, 1961,  
no. 10, 10-13)

TEXT: In order to determine the energy spectrum of particles leaving the target as neutral atoms, the interaction was investigated of the complete energy spectrum of Na atoms with Ta surface, arising as a result of bombardment of an auxiliary Ta target with  $\text{Na}^+$  ions. On the basis of the measurement of energy distribution and critical energies of  $\text{Na}^+$  ions of the secondary neutral-ion emission, the authors conclude that during the bombardment of solid bodies with ions, these particles are elastically scattered by atoms both as positive ions and neutral atoms. Energy distributions of the scattered ions and neutral atoms do not differ substantially from each other. [Abstractor's note: Complete translation].

Card 1/1

ARIFOV, U. A.; KULAGIN, A. I.; PARILIS, E. S.; KHARMATS, D. Ye.;  
LEVKOVICH, B. A., prof., red.; BAKLITSKAYA, A. V., red.;  
KARABAYEVA, Kh. U., tekhn. red.

[Delinting cottonseed] Ogolenie semian khlopchatnika. Tashkent,  
Izd-vo Akad. nauk Uzbekskoi SSR, 1962. 330 p. (MIRA 16:3)

1. Chlen-korrespondent Akademii nauk Uzbekskoy SSR (for  
Levkovich).

(Cottonseed) (Cotton machinery)

ARIFOV, U.A.; KLEYN, G.A.; OKUN', G.S.; LAPIDUS, L.A.; PASHINSKIY, S.Z.;  
KIM, G.S.

Physical and mechanical properties of silk and fabrics manufactured from cocoons killed by gamma rays. Izv. AN Uz. SSSR. Ser. fiz. mat.nauk 6 no.2:59-66 '62. (MIRA 15:9)

1. Akademiya nauk UzSSR.  
(Sericulture) (Gamma rays--Industrial applications)

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S/048/62/026/011/010/021  
B125/B102

AUTHORS: Arifov, U. A., Rakhimov, R. R., and Khozinskiy, O. V.

TITLE: Electron emission from metals when bombarded by certain inert gas ions in the energy range up to 50 kev

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya, fizicheskaya, v. 26, no. 11, 1962, 1398 - 1403

TEXT: A report is given on the electron emission from hot molybdenum, tungsten, and nickel foils when bombarded with  $\text{He}^+$ ,  $\text{Ne}^+$  and  $\text{Ar}^+$  ions within the energy range 1 to 50 kev in a glass vacuum apparatus ( $2 - 3 \cdot 10^{-7}$  mm Hg). It consisted of an ion source, a region in which the beam was formed by an electrostatic lens system and a measuring arrangement. The narrow ion beam was accelerated mainly by an electric field. Results: (1) in the energy range studied the coefficient  $\gamma$  of kinetic electron emission increases linearly with the ion velocity  $v_0$ ; (2) at given ion velocity  $\gamma_{\text{Ar}} > \gamma_{\text{Ne}} > \gamma_{\text{He}}$ . (3) If the type of the bombarding ion is given, then  $\gamma_{\text{Mo}} > \gamma_{\text{W}} > \gamma_{\text{Ni}}$ . The linear dependence  $\gamma(v_0)$  for  $\text{Ar}^+$  and  $\text{Ne}^+$  ions corresponds well with that

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Electron emission from metals when...

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calculated by E. S. Parilis, L. M. Kishinevskiy (Fizika tverdogo tela, 3, 1219 (1961)) on the basis of the statistical theory of inelastic collisions. Since the experimental and the theoretical data for  $\text{He}^+$  diverge greatly, statistical studies concerning ions with few electrons must be made more thoroughly. The differences in the  $\gamma$ -values obtained for Mo, W, and Ni are due to an effect of the work function on the excited-electron yield. The lack of proportionality between  $\gamma$  and the work function of the metal seems to be due to additional factors whose effects are not yet understood. There are 6 figures.

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26. 2340

AUTHORS:

Arifov, U. A., Rakhimov, R. R., Abdullayeva, M., and  
Gaipov, S.

TITLE:

The electron emission from metals induced by light ions<sup>11</sup>

PERIODICAL:

Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya,  
v. 26, no. 11, 1962, 1403-1409

TEXT: The electron emission from pure molybdenum during bombardment by ions of the hydrogen isotopes and by  $\text{He}^+$  ions is studied in the range of 0.1-0.45 kev to obtain information regarding the effect of the ion mass on the kinetic electron emission. The experimental apparatus comprised the ion source mass separator, principal accelerating tube, receiver part and source of the auxiliary beam of  $\text{Ar}^+$  ions. The pressure of the residual gases was  $2 \cdot 10^{-7}$  mm Hg. The coefficient  $\gamma$  was measured between 1300 and 1400°K. The best target material was found to be molybdenum. In the energy range of 0.1-4.0 kev the target was bombarded only by  $\text{H}_2^+$  and  $\text{D}_2^+$  ions.  $\gamma \sim 6\%$  for  $\text{H}_2^+$  and  $\text{D}_2^+$  at energies up to 300 ev; if the energy, continues to

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26.2340

AUTHORS:

Arifov, U. A., Flyants, N. N., and Ayukhanov, A. Kh.

TITLE:

Some properties of the ion induced secondary neutral emission

PERIODICAL:

Akademiya nauk SSSR. Izvestiya, Seriya fizicheskaya,  
v. 26, no. 11, 1962, 1414-1418

TEXT: This study provides the first direct information on the energy spectrum of neutral atoms being emitted from a solid body bombarded by positive ions. The number of these neutral atoms was determined directly and the fractions of neutralized and ionic components of secondary emission from tantalum were measured by using a T-shaped glass apparatus, evacuated to  $\sim 1 \cdot 10^{-6}$  mm Hg, with two Ta targets. Before every test series the targets were heated to 2500°K for 6-8 hrs. During the measurements, target 1 was kept at 1200°K and target 2 at 950°K. The ions bombarding target 1 were produced by surface ionization of alkali-halogenide salts. The targets were surrounded by ion collectors and the ion beam had to travel between condenser plates so that only the neutral

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Some properties of the ion ...

particles leaving the surface of target 1 could reach target 2. The existence of end-point energies of the scattered ions indicate an individual elastic collision of the incident ion with an atom of the target unaccompanied by charge exchange. For a part of the elastic collisions of the primary ion with target atoms, an electron is captured and the ion is neutralized. When this neutral beam, hits target 2, it causes surface ionization and secondary emission. The high energy of particles knocked-out from target 2 by neutral atoms can be explained only in the following ways: The neutral component of the secondary emission contains scattered neutral atoms. The neutral atoms hitting target 2 leave it as positive ions and retain a considerable part of their energy. During the bombardment of target 1 by 100-ev  $\text{Na}^+$  ions, secondary ions of 77 ev are emitted. If neutral atoms of  $E_{\text{max}} = 77$  ev hit target 2 the end-point energy of the secondary ions from target 2 amounts to 59 ev. The delay curve for bombardment by secondary ions is similar to the delay curve for bombardment by secondary neutral atoms. The fast neutral atoms are also elastically scattered if target 1 is at other temperatures. The intensity of the neutral component remains almost constant up to

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Some properties of the ion ...

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$T \sim 1000^\circ\text{K}$ . The current increase that attends further temperature rise is due to thermal ions. The secondary neutral emission and the secondary ion component apparently contain the same groups of secondary particles. The scattering mechanism of primary ions from a metallic surface in the form of neutral atoms is essentially similar to that of the scattering of positive ions. There are 5 figures. +

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AUTHORS: Arifov, U. A., and Khadzhimukhamedov, Kh. Kh.  
TITLE: Study of the dependence of the secondary ion emission components on energy, type of ions, and target material  
PERIODICAL: Akademiya nauk SSSR.. Izvestiya. Seriya fizicheskaya, v. 26, no. 11, 1962, 1422-1425

TEXT: The dependence of the coefficients  $K_{sc}$  for scattered ions,  $K_{ev}$  for evaporated ions, and  $K_{diff}$  for diffuse ions, on the energy  $E_0$  (75-1600 ev) and on the type ( $Na^+$ ,  $K^+$ , and  $Rb^+$ ) of the bombarding ions, and on the target material (Ta, Mo, Ni) is investigated. The experiments were made under a vacuum of  $\sim 10^{-7}$  mm Hg.  $K_{sc}$  and  $K_{ev}$  decrease, but  $K_{diff}$  increases, with increasing energy  $E_0$  of the primary ions. At high energies all three coefficients, and also their sum  $K_{\Sigma}$ , tend to saturation. The maximum of  $K_{ev}$  at  $\sim 300$  ev suggests maximum adsorption of primary ions on the target surface at this energy. The bombardment of a Ni target with  $K^+$  ions  
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Study of the dependence of ...

gives results similar to that of a Ta target with  $K^+$  ions. For Ni +  $K^+$   $K_{\Sigma}$  is energy independent and equals 100%. In this case  $K_{ev}$  has its maximum at 500 ev and an ion diffusion current occurs at  $\sim 600$  ev. The numbers of primary and secondary ions are completely in equilibrium. A decrease of  $K_{sc}$  is always compensated by an increasing sum of  $K_{ev}$  and  $K_{diff}$ . The bombardment of a Mo target with  $Rb^+$  ions gives results similar to that of a Ta target with  $K^+$  ions. Here, too,  $K_{\Sigma}$  decreases, at first steeply, then more flatly, with increasing  $E_0$ . In the bombardment of a Ta target,  $K_{ev}$  and  $K_{diff}$  are practically zero. The scattering coefficient  $K_{sc}$ , which is the only coefficient not zero, decreases at first quickly and then more slowly with increasing energy  $E_0$ . The evaporated and the diffuse particles apparently leave the target surface as neutral atoms. The ratio  $K_{ev}/K_{diff}$  depends on the parameters of the colliding particles and on the modulation frequency of the primary ion

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AUTHORS:

26.2312

Arifov, U. A., and Khadzhimukhamedov, Kh. Kh.

TITLE:

Scattering of alkali ions from a metal surface

PERIODICAL:

Akademiya nauk SSSR. Izvestiya.  
v. 26, no. 11, 1962, 1426-1430

Seriya fizicheskaya,

TEXT: Metallic W, Ta, Mo, Ti, and Ni targets were bombarded in vacuo (1-10·10<sup>-7</sup> mm Hg) by Na<sup>+</sup>, K<sup>+</sup>, Rb<sup>+</sup> and Cs<sup>+</sup> ions of 75-1600 ev in order to study the scattering mechanism. In previous investigations (e.g. Izv. AN SSSR. Ser. fiz. 24, 710, 1960; Zh. eksperim. i teor. fiz., 33, 845, 1957) into ion scattering from metal surfaces the experimental functions  $K_{sc} = f(E_0, m_1, m_2)$  diverged considerably. Therefore, the scattering coefficients  $K_{sc}$  were again measured as depending on the energy  $E_0$  and mass  $m_2$  of the bombarding ions and on the mass  $m_1$  of the target atoms. The targets were carefully purified by annealing between 1500 and 3000°K for several days.  $K_{sc}$  was determined from the ratio of the currents of

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B102/B186

# Scattering of alkali ions ...

incident and scattered ions. The end-point energy of the scattered ions was calculated from the relation  $E_1 = E_0 \left[ \frac{m_1 - m_2}{m_1 + m_2} \right]^2$ . When working with hot targets the scattered ions were mixed with evaporated ions which were retained from the collector by a potential of up to 50 v. In the case of Mo targets bombarded by  $\text{Cs}^+$  ( $m_2 > m_1$ ) the scattered ions had only thermal velocities, and no fast ions were recorded.  $K_{sc}(E_0)$  was measured for  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Rb}^+$  and  $\text{Cs}^+$  scattered from Mo ( $300^\circ\text{K}$ ). In all the cases,  $K_{sc}$  decreased with increasing  $E_0$ , rapidly at low  $E_0$  and slowly at high  $E_0$ . At  $E_0 \approx 450-900$  ev the curves obtained for different ions intersect. The shape of the  $K_{sc}(E_0)$  curves was independent of the target material, its position, however, depended slightly on  $m_1$ . For  $\text{K}^+$  ions scattered from different targets, the  $K_{sc}$  values decreased in the sequence of the target materials: W, Ta, Mo, Ni, Ti. With hot targets ( $1500^\circ\text{K}$ ) similar results were obtained; the values of  $K_{sc}$ , however, were always smaller than with

Card 2/3

Scattering of alkali ions ...

S/048/62/026/011/017/021  
B102/B186

cold targets. They decreased very slightly with increasing  $E_0$ . At  $E_0 > 1 \text{ keV}$  the  $K_{sc}$  values remained almost constant. The curves  $K_{sc}(E_0)$  did not intersect,  $K_{sc}$  increased with  $m_1$ . For  $m_2 \ll m_1$  (e.g. scattering of  $\text{Li}^+$  or  $\text{Na}^+$  from Mo) only fast scattered ions were observed and  $K_{sc}$  was independent of the target temperature. The scattering mechanism for  $\text{Cs}^+$ -Mo is not yet clear. Assuming interaction between the incident ion and a group of target atoms of a certain effective mass, so that  $m_{\text{eff}}(E_0)$  has a maximum at  $E_0 \sim 40 \text{ eV}$ , would explain the low-energy maximum of  $K_{sc}$ . The whole curve  $K_{sc}(E_0)$  can be explained with the model of hard spheres if the binding forces in the solid are taken into account. There are 5 figures.

ASSOCIATION: Institut yadernoy fiziki Akademii nauk UzSSR (Institute of Nuclear Physics of the Academy of Sciences UzSSR)

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42428

S/048/62/026/011/020/021  
B125/B102

26.23/2

AUTHORS: Arifov, U. A., Ayukhanov, A. Kh., and Aliyev, A. A. 17

TITLE: Angular distribution of scattered secondary ions when heavy ions bombard light targets

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 26, no. 11, 1962, 1440-1445

TEXT: Hot molybdenum ( $1400^{\circ}\text{K}$ ) and nickel ( $1100^{\circ}\text{K}$ ) targets were bombarded with fast  $\text{Cs}^+$  ions (500-1200 ev) and the angular distribution of the scattered ions was measured. Apparatus and measuring methods have been described by Arifov et al. (Izv. AN UzSSR, Ser. fiz.-mat. nauk, 6, 57, (1961)). In order to retain evaporated ions from the collector, a voltage of 1 v was applied between target and collector. The currents of scattered ions were measured with a movable probe. For angles of incidence between  $0^{\circ}$  (normal) and a certain limiting angle the currents measured were weak and the distribution was cosine-shaped. At angles of incidence  $\Phi$  larger than the limiting angle (scattering angle)  $\beta = \sin^{-1}(m_1/m_2)$  the conditions are completely changed, the weak probe

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Angular distribution of ...

S/048/62/026/011/020/021  
B125/B102

current being supplemented by a strong current of secondary particles emitted at large angles. The solid angle into which this emission takes place increases with  $\Phi$ , but the maximum value of  $\beta$  remains independent of  $\Phi$  at about  $50^\circ$  for Mo (atomic mass  $m_1$ ) bombarded by  $\text{Cs}^+$  (ion mass  $m_2$ );  $\beta$  is also independent of the energy of the bombarding ions. The ions with the cosine distribution have only few ev, the ions of the other group have a maximum energy of 75 ev for 500 ev Cs ions. The higher the energy of the primary particles, the fewer secondary ions are scattered in the direction of  $\beta$ . The number of ions with the cosine distribution does not depend on the energy of the bombarding ions, but decreases slightly when the time of action of the primary ion current on the target is reduced. The angular distributions of the secondary ions in the bombardment of a nickel target with  $\text{Cs}^+$  ions are similar to the distributions described above. The ions with the angular distribution  $\cos \theta$  are scattered by single atoms or atomic systems, whose mass is greater than the mass of the bombarding particles. The ions propagating only within a certain solid angle around  $\beta$  with the energy  $E > (m_1 - m_2)/m_2^2 \cos^2 \beta$  are scattered by elastic collisions with single atoms of the target. There are 4 figures. ✓

Card 2/3 ✓

35534

S/020/62/142/006/006/019  
B104/B108

26.7310  
AUTHORS:

Arifov, U. A., Academician AS Uzbekskaya SSR, Flyants, N. N.,  
and Ayukhanov, A. Kh.

TITLE:

Some properties of secondary ionic-neutral emission

PERIODICAL:

Akademiya nauk SSSR. Doklady, v. 142, no. 6, 1962,  
1265-1267

TEXT: Two Ta targets, each surrounded by a collector and a protective cylinder, were placed in a T-shaped glass container. Target no. 1 (30 by 7 by 0.015 mm) was bombarded with ions generated by surface ionization of an alkali halide. All charged particles between the two targets were deflected by the field of a capacitor so that only the neutral particles emitted from the surface of target no. 1 could reach target no. 2. Pressure during measurement was between 1 and  $3 \cdot 10^{-6}$  mm Hg. Prior to each measuring series the targets were heated to  $2,500^{\circ}\text{K}$  for 6-8 hours. The maximum energy of the neutral atoms striking target no. 2 by bombarding target no. 1 can be calculated from the relation

Card 1/2

35658

S/020/62/143/001/011/030  
B104/B108

26.2317

AUTHORS: Arifov, U. A., Academician AS Uzbekskaya SSR, Gurich, D. D.,  
Mirrakhimova, Kh., and Muzhavirov, S. Z.

TITLE: Investigation of secondary processes caused by fast neutral  
atoms of alkali metals

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 1, 1962, 69-71

TEXT: The experimental arrangement consisted of a source of fast neutral atoms and a semispherical collector (85 mm diameter) with a Ta target (10.10 mm) in its center. The working vacuum was  $5 \cdot 10^{-7}$  mm Hg. The fast neutral atoms were obtained by resonance charge exchange of  $\text{Na}^+$  ions in an Na vapor jet perpendicular to the  $\text{Na}^+$  beam. The flux of the primary ions was measured before and after resonance charge exchange. The flux of neutral atoms was determined from this difference. According to the results, the secondary emission during interaction of fast neutral Na atoms with pure Ta targets and such covered with residual gas films is similar to the secondary emission induced by  $\text{Na}^+$  ions interacting with Ta targets. Scattered positive ions with high energies are observed in both cases.

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Investigation of secondary ...

S/020/62/143/001/011/030  
B104/B108

Under strictly equal conditions, the scattering coefficient of the neutral atoms is higher than that of the ions. There are 2 figures and 5 references: 4 Soviet and 1 non-Soviet. The reference to the English-language publication reads as follows: H. W. Berry, J. Appl. Phys., 8, 1219 (1958).

ASSOCIATION: Institut yadernoy fiziki Akademii nauk UzSSR (Institute of Nuclear Physics of the Academy of Sciences Uzbekskaya SSR)

SUBMITTED: June 17, 1961

Card 2/2

24.2120

35726

S/020/62/143/002/009/022  
B104/B102

AUTHORS:

Arifov, U. A., Member of the AS Uzbekskaya SSR, Rakhimov,  
R. R., and Dzhurakulov, Kh.

TITLE:

Secondary emission on bombardment of molybdenum with neutral  
argon atoms and with argon ions

PERIODICAL:

Akademiya nauk SSSR. Doklady, v. 143, no. 2, 1962, 309-311

TEXT: An experimental arrangement including an ion source, a device for ion beam focusing, a charge-exchange chamber, and a measuring unit was used to investigate the secondary electron emission of Mo, produced by Ar atoms and ions of 0.2-2.0 kev. Neutral atoms of this energy were obtained by resonance charge exchange of Ar ions with natural Ar gas in the chamber. The intensity of the beam of neutral atoms was estimated from the measured value of ion-beam intensity before and after resonance charge exchange. The Ar ions remaining in the beam after resonance charge exchange were deflected by an electric field so that only neutral atoms struck the Mo target. Particular attention was paid to the purity of the target surface. Oscillograms of the volt-ampere characteristic of secondary emission show

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Secondary emission on bombardment ...

S/020/62/143/002/009/022  
B104/B102

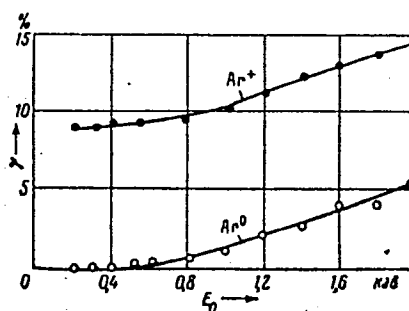
that a field-induced emission is present at low Ar ion energies but is absent at the same energies of neutral atoms (Fig. 2). There are 2 figures and 4 references: 3 Soviet and 1 non-Soviet. The reference to the English-language publication reads as follows: H. D. Hagstrum, Phys. Rev., 104, 672 (1956).

ASSOCIATION: Institut yadernoy fiziki Akademii nauk UzSSR (Institute of Nuclear Physics of the Academy of Sciences Uzbekskaya SSR)

SUBMITTED: June 17, 1961

Fig. 2. Coefficient  $\gamma$  of secondary electron emission.

Legend: energy  $E_0$  of ions and atoms (kev).



Card 2/2

ARIFOV, Ubay A.

"Organizing and planning science in Uzbekistan"

report to be submitted for the United Nations Conference on the  
Application of Science and Technology for the Benefit of the Less  
Developed Areas - Geneva, Switzerland, 4-20 Feb 63.

100-34-2 100-34-2 100-34-2 100-34-2  
ACCRETION NR: AR4015063

S/0299/64/000/014/M023/M023

SOURCE: Ref. zh. Biologiya. Svodnyy tom, Abs. LAM150

AUTHOR: Aripov, U. A.; Gusev, L. K.; Atayants, V. A.

TITLE: Characteristics of "accretion" of bone homotransplants in irradiated animals

CITED SOURCE: Sb. 3 Vses. konferentsiya po peresadke tkaney i organov, 1963. Yerevan, 1963, 252-253

TOPIC TAGS: accretion, bone, homotransplantation, transplantation, irradiation, rabbits, radiation sickness

TRANSLATION: Four experimental series were staged on 20 rabbits. In the first series a bone homotransplant was transplanted from a nonirradiated donor to a nonirradiated recipient; in the second series a bone homotransplant was transplanted from a nonirradiated donor to a irradiated recipient; in the third series a bone homotransplant was transplanted from an irradiated donor to a nonirradiated recipient; in the fourth series a bone homotransplant was transplanted

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ACCESSION NR: AR4045863

ENCL: 00

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45036  
S/109/63/008/001/018/025  
D266/D308

26.2322  
AUTHORS:

Arifov, U. A. and Kasymov, A. Kh.

TITLE:

A method of investigating the energy distribution of secondary electrons in electron bombardment of a metal

PERIODICAL: Radiotekhnika i elektronika, v. 8, no.1, 1963, 138-144

TEXT: The main advantage of the method is the simultaneous measurement of both the integral and the differential distribution. The scheme of the experimental apparatus can be seen in Fig. 1. The primary electron beam is accelerated by the electrodes 2 and while passing through the condenser 3 obtains a square wave modulation of 100 - 1000 cycles. The sample is located at 8, the induced secondary electrons are collected on 5 and the purpose of the grid 6 is to prevent ternary electron emission. The potential of the collector is modulated by the saw tooth generator 15 which at the same time controls the horizontal scale of the oscillograph 20 (collector current is on the vertical scale). At a different position of the switches 17 and 18 the sample is negatively biased in

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S/109/63/008/001/018/025  
D266/D308

A method of investigation ...

respect to the collector and the saw-tooth voltage is fed to the analyzer 11. The electrons of a selected velocity reach the photomultiplier 13 and the amplified current is displayed on the oscillograph 14 (horizontal scale controlled again by the saw-tooth voltage). Thus oscillograph 14 shows the number of electrons at a certain velocity  $v$  whilst the ordinate on oscillograph 20 is proportional to the total number of electrons which have a velocity larger than the corresponding potential difference between collector and sample. Measurements were carried out on specially prepared tantalum and molybdenum samples and the peaks of the results were in good agreement with previously reported measurements (O. W. Richardson, Proc. Roy. Soc. A., 1930, 128, 63, and Chorower, Phys. Rev., 1956, 102, 340). There are 6 figures.

SUBMITTED: March 19, 1962

Card 2/4

A method of investigating ...

S/109/63/008/001/018/025  
D266/D308

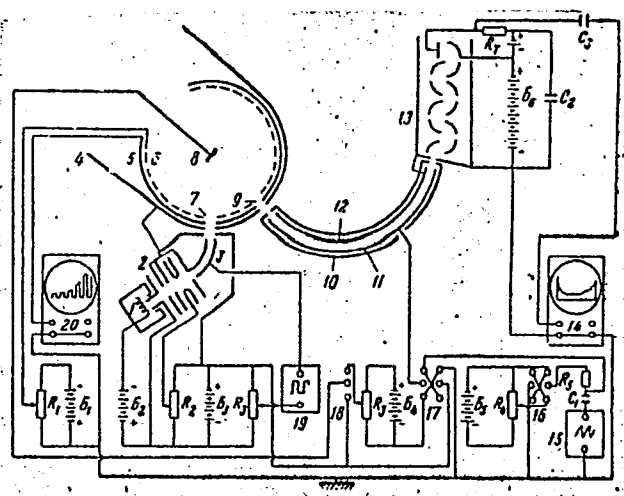


Fig. 1

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A method of investigating ...

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D266/D308

Figure caption:

Apparatus and measurement scheme: 1 - heating coil; 2 - electrostatic lenses; 3 - cylindrical condenser; 4 - shielding cylinder; 5 - collector; 6 - grid; 7 - slot; 8 - sample; 9 - slot; 10 - shield; 11, 12 - cylindrical condenser; 13 - photomultiplier; 14, 20 - oscillographs; 15 - saw-tooth generator; 16, 17, 18 - switches; 19 - square wave generator. 1 to 6 - batteries. ✓

Card 4/4

S/109/63/008/002/015/028  
D413/D308

AUTHORS: Tashkhanova, Dzh.A., Rakhimov, R.R. and Arifov, U.A.

TITLE: Investigation of the secondary electron emission from bombardment of Na films with  $\text{Ne}^+$  and  $\text{Ar}^+$  ions

PERIODICAL: Radiotekhnika i elektronika, v. 8, no. 2, 1963, 294-298

TEXT: In an earlier paper (Izv. Akad. Nauk SSSR, Ser, fiz. v. 24, no. 6, 1960, 664) two of the authors showed the presence of electrons and negative ions in the secondary emission from Na films bombarded by  $\text{Ar}^+$  ions with 720 ev energy. They now study by the magnetic separation method the emission from a film of Na on Mo or Ta when bombarded by  $\text{Ne}^+$  and  $\text{Ar}^+$  ions in the energy range 100-1000 ev. They describe their vacuum apparatus, which is basically the same as that used before. They give oscillograms of the voltage-current characteristics obtained for secondary electrons and secondary negative ions during deposition of Na, and derive curves of the secondary emission coefficients as functions of film thickness and primary ion energy. Card 1/2

Investigation of the secondary ...

S/109/63/008/002/013/028  
D413/D308

gies. The negative ion emission is shown to become negligible for thick and relatively pure Na films, while the potential nature of the electron emission is shown by its almost complete independence of the kinetic energy of the primary ions for all the targets and ions. The secondary electron emission coefficient is shown to depend appreciably on the work function of the surface. The results agree well with others published. There are 6 figures.

SUBMITTED: March 19, 1962

Card 2/2

ARIFOV, U.A.; RAKHIMOV, R.R.; DZHURAKULOV, Kh.

Secondary electron emission during bombardment of molybdenum by  
He, Ne, and Ar atoms and ions. Radiotekh. i elektron. 8 no.2:  
299-302 F '63. (MIRA 16:2)

(Secondary electron emission)



S/109/63/008/002/016/028  
D413/D308

AUTHORS: Flyants, N.N., Arifov, U.A. and Ayukhanov, A.Kh.  
TITLE: Transient secondary emission processes during bombardment of films on metals by fast neutral atoms of another element  
PERIODICAL: Radiotekhnika i elektronika, v. 8, no. 2, 1963, 311-315

TEXT: Although in the study of the interaction of atomic particles and solid surfaces it is of value to investigate bombardment by neutral atoms as well as by ions, this has been neglected because of the difficulties of obtaining suitable fast atom beams and measuring their secondary effects; the experiments that have been done, such as by Chaudry and Khan, have only given information on secondary electron emission. The authors have measured the secondary emission of positive and negative ions from a Ta target both in the clean state and during deposition of a Na film, bombarded with either ions or neutral atoms of Na and K of energies up to

Card 1/2

Transient secondary emission ...

S/109/63/008/002/016/028  
D413/D308

1000 ev. The neutral alkali atom beams were obtained by the technique of resonant overcharge of ions in a stream of the alkali metal vapor. A form of the double modulation method was used for making the measurements. All the results go to show that the secondary emission effects from the action of neutral atoms do not differ qualitatively from those produced by positive ions of the same element. There are 5 figures. The most important English-language reference reads as follows: R.M. Chaudry, A.W. Khan, Proc. Phys. Soc., London B., 61, 1948, 526.

SUBMITTED: March 19, 1962

Card 2/2

S/109/63/008/002/017/028  
D413/D308

AUTHORS: Arifov, U.A. and Khashimov, N.M.  
TITLE: Secondary emission during bombardment of tungsten by negative chlorine ions  
PERIODICAL: Radiotekhnika i elektronika, v. 8, no. 2, 1963, 316-321

TEXT: Although a number of papers have been published on the bombardment of targets by negative ions, the target surfaces used have not been prepared in clean enough condition. The authors have studied the bombardment of tungsten targets by  $^{35}\text{Cl}^-$  ions with energies from 0.4 to 6 kev; the target was degassed at 2300 - 2500°K for 8 - 10 hours until a vacuum of  $10^{-7}$  mm Hg or better was reached, and was maintained at 1100° or 1250°K during bombardment, measurements also being taken with targets not subjected to degassing. The  $^{35}\text{Cl}^-$  ions were obtained by bombarding a NaCl film on a Mo target with  $\text{Na}^+$  ions, giving an ion current of about  $10^{-9}$  A, and were chosen for ready comparison of the results with those derived from  $^{40}\text{Ar}$

Card 1/2

Secondary emission ...

S/109/63/008/002/017/028  
D413/D308

atoms and  $^{39}\text{K}^+$  ions. The double modulation method was used for the measurements, and only negatively charged particles were found throughout in the secondary emission, i.e. scattered primary ions and kinetic electron emission. The results were strongly dependent on the condition of the surface. The scattering coefficient for the primary ions decreased from 16 to 10% as the energy increased from 0.4 to 2.5 keV, then remaining constant up to 6.5 keV. For primary ion energies below 1 keV the kinetic electron emission was small, but then it increased linearly with the energy up to 6.5 keV. This characteristic agrees well with those obtained for Ar atoms and  $\text{K}^+$  ions, indicating that the phenomenon is independent of the charge state of the bombarding particle. There are 5 figures.

SUBMITTED: March 19, 1962

Card 2/2

ARI FOV, U. H.

AID Nr. 981-1 3 June

MEASURING SECONDARY ION AND ELECTRON EMISSION DURING FILM  
DEPOSITION ON METALS (USSR)

Arifov, U. A., A. Kh. Ayukhanov, and S. V. Starodubstev. Radiotekhnika  
i elektronika, v. 8, no. 4, Apr 1963, 669-674. S/109/63/008/004/017/030

A vacuum-tube instrument is described which permits improved observation of high-speed deposition of Na or Mg on a Ta substrate. The device can measure simultaneously the coefficients of secondary emission from the target surface caused by either bombardment by particles of two energy levels or by alternate bombardment of electrons and ions. This electrical circuit differs from the usual double modulation circuit in that the bombarding particles are energized both with a d-c potential,  $E_0$ , and a square-wave generator, whose wave form is in turn modulated by a sinusoidal voltage  $E_a \sin \omega t$ . Thus a current of secondary particles, changing periodically per  $I = I(E_0 + E_a \sin \omega t)$ ,

Card 1/2

AID Nr. 981-1 3 June

MEASURING SECONDARY ION [Cont'd]

S/109/63/008/004/017/030

appears at the collector. This current is fed to the vertical deflection amplifier of a cathode-ray oscillograph. The modulation of the primary ion (or electron) current by the modulated rectangular pulses makes it possible to obtain the zero line automatically and to measure secondary currents caused by the maximum-energy ( $E_0' + E_a'$ ) and minimum-energy ( $E_0' - E_a'$ ) primary particles. The results of bombardment with electrons show that the dependence of the secondary emission of negative particles on film thickness, while differing quantitatively for different bombarding-ion energies, are identical qualitatively and that the coefficients of the secondary emission of negative particles due to both ion and electron bombardment undergo qualitatively similar changes with an increase in film thickness. It is concluded that the method described makes it possible to obtain reliable evaluations for a number of basic secondary emission characteristics.

[DW]

Card 2/2

~~SECRET~~

0018-0104/02/020000-02\$05.00/0

А. А. Бабуров, А. В.

SOURCE: AN UzSSR. Izvestiya. Seriya Fiziko-matematicheskikh nauk, no. 4, 1964, 20-24.

TOPIC TAGS: secondary ion, ion scattering, angular distribution, energy spectrum, metal bombardment, alkali metal ion

**ABSTRACT:** The authors previously studied (see, e.g., Izv. AN SSSR, ser. fiz.-mat. nauk, no. 4, 1963, 86) the angular dependence of the current of secondary ions during the bombardment of metallic targets by  $\alpha$ -particles. However, as a function of the angle of incidence of the particles, the study of the angular dependence of the current of secondary electrons has not been carried out.

50 2 2/2

1. 20000-66  
ACCESSION NR: AP5000466

W targets and 20+ E. = 2000 a bombardment of Ta targets are shown in Tables 1 and 2 of the Enclosure, respectively. The targets were used in the 1950s and 1960s.

$$F = E_1 + \frac{(p-1)^2}{(p+1)^2} E_2 \quad (1)$$



ACCESSION NR AP5000466

ENCLOSURE: 01

Table 1. Angular dependence of energy spectrum for  $\text{Na}^+$  bombardment of W.

a) Coefficient $\eta = \frac{E}{E_0}$	b) Incident angle, degrees									
	0	10	20	30	40	50	60	70	80	90
$\eta_1$	0.96	0.98	0.91	0.71	0.79	0.82	0.85	0.49	0.93	
$\eta_2$	0.90	0.97	0.71	0.73	0.79	0.82	0.84	0.48		
$\eta_{\text{max}}$	0.77	0.80	0.81	0.83	0.88	0.90	0.93	0.93	0.98	

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L 22555-65

ACCESSION NR: AP5000466

ENCLOSURE: 02

Table 2. Angular dependence of energy spectrum for  $Rb^+$  bombardment of Ta.

(a)

Coefficient	Incident angle, degrees									
$\eta = \frac{E}{E_0}$	0	10	20	30	40	50	60	70	80	
0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	
0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	
0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	
0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	
0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	
0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	
0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	
0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	
0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	
0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	
0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	
0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	
0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	
0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	
0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	
0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	
0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	
0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	
0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	
0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	
0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	
0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	
0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	
0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	
0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	
0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	
0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	0.64	
0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	
0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	
0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	
0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	
0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	
0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	
0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	
0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	
0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	
0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	
0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	
0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	
0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	
0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

Card 4/4

L 12038-65 EWT(1)/EWG(k)/EWT(n)/EPF(c)/EPF(p)-2/EPF/EPF(w)-2/EEC(a)/T/EEC(b)-2.  
 EWT(n) = 1; EPF(c) = 1; EPF(p) = 1; EPF(w) = 1; EECA(a) = 1; EECA(b) = 1;  
 ACCESSION NR: AP4045289 ID:NN/0048/64/028/009/1402/1408

AUTHOR: Arifov, U.A.; Gruich, D.D.; Chastukhina, L.Yu.

TITLE: Some distinctive features of secondary emission in bombardment of metals by low energy ions /Report, Tenth Conference on Cathode Electronics held in Kiev, 11-18 Nov 1963/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v.28, no.9, 1964, 1402-1408

TOPIC TAGS: ion bombardment, low energy, secondary emission, ion energy, ion emission

**ABSTRACT:** The energy distributions of the secondary ions emitted by W, Mo and Ta targets bombarded by  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Rb}^+$ ,  $\text{Cs}^+$  and  $\text{Ba}^+$  ions accelerated to from 30 to 420 eV were investigated. The measurements were undertaken to elucidate certain previously discovered peculiarities of the energy spectra: the existence of a group of low energy secondary ions, and the excess of the energy of the elastically scattered group over that permitted by the conservation laws for a singly scattered ion. The ion source and the method of determining the secondary emission coefficient have been described elsewhere (D.D.Gruich, N.A.Rakhimbayeva and T.U.Arifov, Izv.AN

1/3

L 12038-65  
ACCESSION NR: AP4045289

UzSSR, ser. fiz.-mat. nauk, No. 1, 53, 1964). The ions were incident normally on the target over a  $2 \times 18 \text{ mm}^2$  area at a current density of  $10^{-6} \text{ A/cm}^2$ , and the secondary ions were observed at an angle of  $135^\circ$ . The secondary ions passed through a  $127^\circ$  cylindrical electrostatic analyzer (resolution 1.5%) to which a sawtooth potential was applied, and the energy distribution was displayed on an oscilloscope. The uncertainty in the energy of the elastically scattered ions due to the finite acceptance angle of the analyzer was 1.2%. The targets were outgassed for two days under high vacuum and at high temperature ( $2200^\circ\text{K}$  for the W and Mo targets); the working pressure was  $5 \times 10^{-8} \text{ mm Hg}$ . The results are presented in the form of curves showing the secondary emission coefficients as functions of the incident ion energy. Separate curves are given for the elastically scattered ions and the low energy group; for the latter curves are also given showing the secondary emission coefficients as functions of the secondary ion energy. The secondary emission coefficients for both groups increase with decreasing incident ion energy, slowly at first and then more rapidly, and reach maxima at low or moderate energies. As functions of the secondary ion energy, the emission coefficients for the slow group (at 200 eV incident energy) were of the order of 10% at 5.2 eV and increased with decreasing energy to 25 to 55% at 3.9 eV. The ratio of the energy of the elastically scattered group to the incident ion energy for  $\text{K}^+$  on Mo increased with decreasing in-

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L 12038-65  
ACCESSION NR: AP4045289

cident ion energy from the theoretical value for single scattering event, namely, 0.22 at 400 eV to about 0.44 at 40 eV, the increase being most rapid below 80 eV. These results are discussed at some length, and it is tentatively concluded that the excess energy of the elastically scattered group is due to multiple scattering from single target atoms rather than single scattering from groups of atoms, and that the slow group is due to the emission of adsorbed ions as the result of lattice vibrations excited by the incident beam. Orig.art.has: 3 formulas and 7 figures.

ASSOCIATION: Fiziko-tekhnicheskiy institut AN UzSSSR (Physicotechnical Institute, AN UzSSR)

SUBMITTED: 00

ENCL: 00

SUB CODE: NP, MM

NR REF SOV: 011

OTHER:000

3/3

ACCESSION NR: AP4022711

S/0020/64/155/002/0306/0308

AUTHOR: Arifov, U. A. (Academician); Ayukhanov, A. Kh.; Sustrov, V. A.; Khasanov, R. M.; Poltoratskiy, V. I.

TITLE: Cathode sputtering of tungsten by potassium ions

SOURCE: AN SSSR. Doklady\*, v. 155, no. 2, 1964, 306-308

TOPIC TAGS: cathode sputtering, tungsten sputtering, tungsten surface purification, tungsten, potassium ion,  $^{74}\text{W}^{184}$ , potassium

ABSTRACT: The authors investigated the sputtering of tungsten in a form of chemical compounds and also studied the conditions for obtaining a pure tungsten surface. Radioactive tracers were used for determination of the amount of sputtered material. Polycrystalline tungsten targets with induced activity ( $^{74}\text{W}^{184}$ ) were bombarded with potassium ions. The sensitivity of detection was  $10^{-9}$  gm. The experimental details were given in author's paper (Iz. AN UzSSR, No. 2, 1963). It was found, by using retarding or accelerating potentials, that

Card 1/2

ACCESSION NR: AP4022711.

the spattered particles were negative ions to a considerable extent. This is attributed to the adsorption of residual gases by tungsten atoms. Heating the target reduces the number of negative ions. At  $T > 1600K$ , the spattering is temperature independent, which indicates that the tungsten compounds are practically absent, and that the spattering is characteristic of a pure surface. Orig. art. has: 4 figures.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk UzSSR (Physics-Engineering Institute, AN/UzSSR)

SUBMITTED: 21Sep63

DATE ACQ: 08Apr64

ENCL: 00

SUB CODE: PH

NO REF SOV: 003

OTHER: 002

Card 2/2

101-1-5 EPA/612/R-77-001 EPA HEADQUARTERS, WASHINGTON, D.C. 20460

1. The following is a list of the names of the persons who have been appointed to the various positions in the organization of the American Society of International Law, for the year 1917-1918:

TITLE: Investigation of the complete energy spectrum of the second electrons of Sn and Pb in the solid and liquid states

SOURCE: AN SSSR. Doklady\*, v. 158, no. 1, 1984, 42-85

TOPIC TAGS: tin, indium, solid state, liquid state, energy spectrum, secondary electron, electron spectrum

ABSTRACT: In view of the lack of a thorough study of the complete secondary-electron spectrum of some low-melting-point metals bonded with dielectric materials, the secondary-electron spectrum of the Au-epoxy system was studied. It was found that the secondary-electron spectrum of the Au-epoxy system is similar to that of the Au-epoxy system. The results of the study are presented.



L 8418-65

ACCESSION NR: AP4045095

instrument in conjunction with a high-speed oscilloscope. The primary electron energy ranged from 100 to 1000 eV. The equipment employed is shown in Fig. 1 of the enclosure and is similar to that described by the authors earlier (Radiotekhnika i elektronika v. 8, 136, 1963) (Izv. AN UzSSR, ser. fiz.-matem. nauk, 92, 1963), but has been modified to permit operation with a liquid metal. Another distinguishing feature of the method is that the voltage-current characteristic and the complete spectrum of the secondary electrons are recorded simultaneously on the screens of the oscilloscopes. This makes it possible to observe visually the variation of the coefficients and the differential spectra of the secondary electrons during the melting and solidification of the investigated materials. The experimental results are shown in Fig. 2 and 3. The authors note that the method described makes it possible to obtain reliable data on the change in the secondary electron spectra during the melting of metals. The authors also note that the method described makes it possible to obtain reliable data on the change in the secondary electron spectra during the melting of metals.

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L 8418-65

ACCESSION NR: AP4045095

electrons is determined by the energy structure of the metal, and therefore does not depend on the aggregate state of the investigated substance. The results also prove experimentally for the first time that melting does not exert a noticeable influence on the position of the maxima of the characteristic losses in tin, as deduced theoretically by G. Fridman (UPN v. 62, 427, 1957). Orig. art. has: 4 figures.

ASSOCIATION: Fiziko-tekhnicheskii institut Akademii nauk UzSSR  
(Physical-Technical Institute, Academy of Sciences, UzSSR)

ADMITTED: 1. 1961

PN 1

INT. INDEX: NP, MM

OTHER: 1961

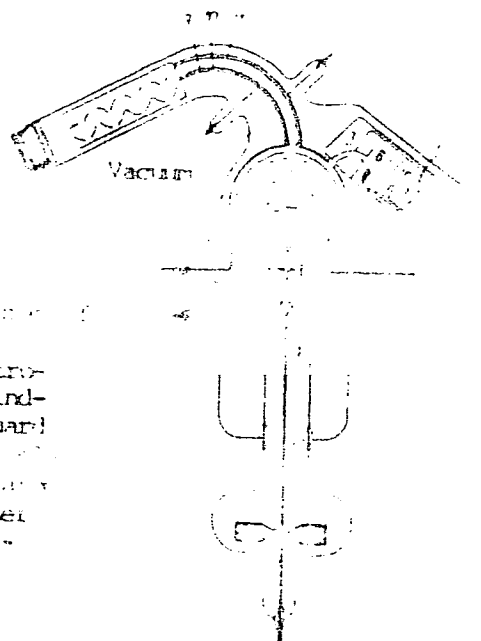
Card 3/4

L 3418-65

ACCESSION NR: AP4045095

ENCLOSURE: 01

0



1 - filament, 2 - electrostatic lenses, 3 - cylindrical capacitor, 4 - guard cylinder, 5 - electron gun, 6 - electron gun, 7 - electron gun, 8 - electron gun, 9 - electron gun, 10 - electron gun, 11 - electron gun

1 - filament, 2 - electrostatic lenses, 3 - cylindrical capacitor, 4 - guard cylinder, 5 - electron gun, 6 - electron gun, 7 - electron gun, 8 - electron gun, 9 - electron gun, 10 - electron gun, 11 - electron gun

Card 4/4

L 46234-65 EWT(m)/EPF(n)-2/T/ENP(t)/EWP(b)/EWA(c) Pu-4 IJP(c) JD/JG

ARSO12302

UP/0058/65/000/001/H069/J069

Ser. zh. Fizika, Abs. 323410

AUTHOR: Arifov, U. A.; Gruich, D. D.

TITLE: Electrical spectra of alkali metal ions emitted from tungsten

CITED SOURCE: Dokl. AN UzSSR, no. 7, 1954, 18-22

TOPIC TAGS: ion emission, alkali metal ion

TRANSLATION: The electrical spectra of secondary ions of  $\text{Na}^+$ ,  $\text{Li}^+$  and  $\text{Cs}^+$  from a tungsten target and  $\text{H}^+$  ions from a graphite target, were obtained using a 100 V electrostatic analyzer. The maximum intensity of the spectra of the secondary ions of  $\text{Na}^+$ ,  $\text{Li}^+$  and  $\text{Cs}^+$  is observed at a retarding potential of 10-15 V. The spectra of the secondary ions of  $\text{H}^+$  are observed at a retarding potential of 10-15 V. The appearance of the spectra of the secondary ions of  $\text{Na}^+$ ,  $\text{Li}^+$  and  $\text{Cs}^+$  is observed at a retarding potential of 10-15 V. The appearance of the spectra of the secondary ions of  $\text{H}^+$  is observed at a retarding potential of 10-15 V.

Card 1/2

1. 10/10/66

ACCESSION NR: AP5012302

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1. 10/10/66 1. 10/10/66 1. 10/10/66 1. 10/10/66 1. 10/10/66 1. 10/10/66 1. 10/10/66 1. 10/10/66 1. 10/10/66 1. 10/10/66

1. 10/10/66 NP

ENCL: 00

10  
Card 2/2

L 21003-66 EWT(1)/EWT(m)/EWP(t)/ IJP(c) AT/JD/HW/JG

ACCESSION NR: AR5014418

UR/0058/65/000/004/H058/H058

SOURCE: Ref. zh. Fizika, Abs. 4Zh352

AUTHOR: Arifov, U. A.; Kasymov, A. Kh.

TITLE: Angular and energy distribution of secondary electrons when metals are bombarded by electrons

CITED SOURCE: Dokl. AN UzSSR, no. 8, 1964, 15-17

TOPIC TAGS: secondary electron emission, electron spectrum, electron bombardment, angular distribution, electron distribution, electron energy

TRANSLATION: An electrostatic analyzer was used for an energy analysis of secondary electrons. It was found that variations in the angle of incidence from  $0^\circ$  to  $70^\circ$  had no effect on the position of maxima in the low energy region, nor on the characteristic losses in the spectra of secondary electrons for nickel and tungsten (within limits of measurement accuracy of  $\sim 1$  eV). When the angles of incidence are close to the angle of reflection, two maxima and a minimum are observed in the spectra of slow secondary electrons. One maximum corresponds to angles of incidence at which

Card 1/2

L 21008-66

ACCESSION NR: AR5014418

the depth of penetration of the primary electrons is optimum for the formation and emission of secondary electrons. A maximum at smaller angles of incidence of the primary electrons is due to inelastic reflection of electrons. The intensity of these maxima is independent of the angle of incidence of the primary electrons. The intensity of the peaks for characteristic losses and elastically reflected electrons is reduced as the angle of incidence of the primary electrons increases, passes through a minimum and then through a low maximum at angles of incidence close to the angle of reflection. V. Shustrov

SUB CODE: NP

ENCL: 00

Card 2/2

ARIFOV, U.A.; ALIYEV, A.A.; AYUKHANOV, A.Kh.

Angular dependence of the energy spectra of secondary ions  
following the bombardment of metals with positive ions. Izv.  
AN Uz.SSR.Ser.fiz.-mat.nauk 8 no.4:20-26 '64.

(MIRA 18:3)

1. Fiziko-tekhnicheskii institut AN UzSSR.



TITLE: Thermoelectric heat-to-electricity conversion

TOPIC TAGS: thermoelectric energy converter, thermoelectricity, solar energy

ABSTRACT: The state-of-the-art (as of 1963) of thermoelectric heat-to-electricity

Card 1/2

1-00  
- DEVISION NR: APSOLV

ASSOCIATION: Fiziko-tekhnicheskiy institut AN UzSSR (Physicotechnical Institute,  
AN UzSSR)

SUBMITTED: 15Nov64

ENCL: 00

SUB CODE: EE

NO REF SOV: 009

OTHER: 008

ATT PRESS: 4012

182  
Card 2/2

1. 1961-01

1. 1961-01

1. 1961-01

SOURCE: Geliotekhnika, no. 1, 1961, 29-30

TOPIC TAGS: solar energy converter, film concentrator, concentrator base design, asbestos cement, polyethylene terephthalate film, binding resin, integral reflection coefficient

ABSTRACT: The authors used a mirror surface of metallized polyethylene terephthalate

L 52574-65

ACCESSION NR: AP 5-11 2027

ASSOCIATION: Fiziko-tekhnicheskiy Institut AN UzSSR (Physics and Engineering  
Institute - AN UzSSR)

SUBMITTED: 20-11-74

NO. 111 001 000 001

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Gord



L 53802-65

ACCESSION NR: AP5011669

Weak currents can be detected by means of pulse amplitude discrimination. Currents as low as  $10^{-17}$  amp can be measured. However, the method has several drawbacks, such as the need for a super-cryogenic environment and the fact that even the present-day superconducting detectors are not yet sensitive enough to detect the weak currents of interest.

ASSOCIATION: Fiziko-tekhnicheskiy institut, AN UzSSR (Physicotechnical Institute, AN UzSSR)

SUBMITTER: 07Jun64

ENCL: 1

MR: 1000 40

NO. 1000 40

40

1000 4022

Cord

1. [Illegible text]

CITE SOURCE: [Illegible text]

SUBJECT: HP

ENCL: 00

Card 1/1

tungsten

ABSTRACT: To obtain some data on the mechanism of interaction between primary incident electrons and electrons of a metal, and the behavior of the secondary electron emission.

Page 1/3



ABSTRACT: 41, 111

of the theory of the ...

1963, No. 4). The results show that the positions of the maxima of

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ADDITIONAL INFORMATION:

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ADDITIONAL INFORMATION: This information is being provided for your information only. It is not to be used for any other purpose.

Card 3/3

Author: Arifov, A. A.

Author: Arifov, A. A.

TITLE: Angular dependence of the energy spectra of secondary ions in the bombardment of a solid surface by a beam of ions

Source: Journal of Applied Physics

Abstract: Angular dependence of the energy spectra of secondary ions in the bombardment of a solid surface by a beam of ions

TRANSLATION: Using an electrostatic analyzer and a detector located at the angle of observation of the secondary ions, the angular dependence of the energy spectra of secondary ions in the bombardment of a solid surface by a beam of ions was studied.

The results show that the angular dependence of the energy spectra of secondary ions is determined by the angle of observation of the secondary ions and the angle of incidence of the primary ions on the surface.

Card 1/2

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Card 2/2



Card 2/2

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emission of electrons and of negative ions from films of A. M. M. bombarded with  
 X-rays and at an energy of 100 eV. The experiments were made with an in-  
 strument analogous to that described earlier (Khariz, 1963, 1120594) in a vacuum  
 of  $10^{-6}$  mm Hg. The results are given in the table.

The results show that the emission of electrons and negative ions from films of A. M. M.  
 is very sensitive to the energy of the bombarding X-rays. The emission of electrons  
 is observed at an energy of 100 eV and above, while the emission of negative ions  
 is observed at an energy of 100 eV and below.

Cont: 1/2

10-10-68

10-10-68

smallest, potential electrostatic emission is observed upon bombardment with sodium

ions. The emission spectrum of the sodium ion source is shown in Figure 1. The emission spectrum of the sodium ion source is shown in Figure 1. The emission spectrum of the sodium ion source is shown in Figure 1.

Card 2/2



ARIFOV, U.A.; KOGAN, V.I.; KHALIKOV, A.Kh.

Use of a scintillation counter in recording a stream of secondary electrons when studying secondary ion-electron emission with the aid of the pulse counting method. Izv. AN Uz. SSR. Ser. fiz.-mat. nauk 9 no.2:16-22 '65. (MIRA 18:6)

1. Fiziko-tekhnicheskii institut AN UzSSR.

L 2105-66 EWT(1)/EWT(m)/EPA(sp)-2/EPF(c)/EPA(w)-2/EWP(t)/EWP(z)/EWP(b) IJP(c)

ACCESSION NR: AR5014649 JD/HW/JG/AT UR/0275/65/000/005/V003/V004

621.38:62

SOURCE: Ref. zh. Elektronika i yeye primeneniye. Sv. t.; Abs. 5V20

AUTHOR: Arifov, U. A.; Gruich, D. D.

TITLE: Energy spectra of slow ions emitted by a metal surface as a result of ion bombardment

CITED SOURCE: Dokl. AN UzSSR, no. 11, 1964, 20-23

TOPIC TAGS: ion bombardment, slow ion, energy spectrum

TRANSLATION: Energy spectra of slow  $\text{Cs}^+$  ions emerging from pure cold and hot Ni, Mo, and W-targets were studied by means of a  $127^\circ$  cylindrical capacitor with a resolution  $\Delta E = 0.5$  ev. The secondary ions were analyzed at an angle of  $135^\circ$  with respect to the direction of the primary  $\text{Cs}^+$  ions which fell on the target normally. Thermionic-emission and slow-ion peaks are resolved in the spectra. The slow-ion spectrum width is independent of the target temperature; however, it increases in the same order as the atom bond energies

Card 1/2

L 2105-66

ACCESSION NR: AR5014649

in the Ni-, Mo-, and W-targets. With the experimental spectra plotted in semi-logarithmic scale, their right-of-maximum branches well register with the straight lines whose slopes are in the same order. This permits presuming that the slow ions acquire their energy from intense oscillation of atoms in that target section which is excited by the ion bombardment. Bibl. 3.

SUB CODE: NP

ENCL: 00

Card 2/2

ARIFOV, U.A.; KASYMOV, A.Kh.

Angular dependence of the complete energy spectrum of secondary electrons during the bombardment of metals with electrons.

Izv. AN Uz. SSR. Ser. fiz.-mat. nauk 9 no.2:23-28 '65.

(MIRA 18:6)

1. Fiziko-tekhnicheskiy institut AN UzSSR.

L 3530-66 EWT(d)/EWI(1)/EWI(m)/EEG(k)-2/EPA(w)-2/T/EWA(m)-2 LJP(c) AT  
ACCESSION NR: AP5015452 UR/0166/65/000/003/0029/0031  
AUTHORS: Arifov, U. A.; Kogan, V. I.; Khalikov, A. Kh.  
TITLE: Registration of secondary-electron current with a scintillation counter (by the method of measuring the total current)

SOURCE: AN UzSSR. Izvestiya. Seriya fiziko-matematicheskikh nauk, no. 3, 1965, 29-31

TOPIC TAGS: secondary electron emission, scintillation counter, measuring apparatus

ABSTRACT: A method previously investigated by the authors (Izv. AN UzSSR, seriya fiz.-mat. nauk, 1965, no. 2, 16) for the measurement of secondary-emission current, by counting the current pulses produced at the output of a photomultiplier when the secondary electrons strike a scintillator, is improved in the present investigation by using an oscilloscope to record the total current from the photomultiplier output and by bombarding the target with a modulated primary ion beam. The equipment and the experimental procedure are

Card 1/2

L 3530-66

ACCESSION NR: AP5015452

described in detail. Although the results are still tentative, it is concluded that the sensitivity of the method (up to  $1 \times 10^{-15}$  amperes) is higher than that of an electrometer, and the method offers also advantages of higher speed and insensitivity to a strong light background. A shortcoming of the method is the need for a high vacuum (on the order of  $10^{-9}$  mm Hg). Orig. art. has: 1 figure.

ASSOCIATION: Fiziko-tekhnicheskij institut AN UzSSR (Physicotechnical Institute, AN UzSSR)

SUBMITTED: 02Jun64

ENCL: 00

SUB CODE: NP

NR REF SOV: 003

OTHER: 001

Card

2/2

L 23755-66 EWT(1)/EWT(m) LJP(c) JD/JG/AT

ACC NR: AP6008548

SOURCE CODE: UR/0166/66/000/001/0051/0056

AUTHOR: Arifov, U.A.; Galpov, S.; Ikramova, M.; Rakhimov, R. 56

ORG: Physics Technical Institute, AN UzSSR (Fiziko-tehnicheskii institut AN UzSSR) B

TITLE: Energy distribution of <sup>2/</sup>electrons emitted from films of alkali-haloid compounds subjected to bombardment by He<sup>+</sup> and Ar<sup>+</sup> ions 27 27 27

SOURCE: AN UzSSR. Izvestiya. Seriya fiziko-matematicheskikh nauk, no. 1, 1966, 51-56

TOPIC TAGS: electron emission, secondary electron emission, electron energy, spectral energy distribution, ion bombardment, alkali halide

ABSTRACT: A study of the spectrum of the energy of emitted electrons is important in understanding the mechanism of ion-electron emission from film emitters. The present authors investigated the energy distribution of electrons emitted from NaCl films to Mo during bombardment by He<sup>+</sup> and Ar<sup>+</sup> ions in the 40-2000 ev range. The experimental results presented show that the adsorption and condensation of molecules of alkali-haloid salts on a metal surface leads to substantial variations in the spectrum of the energy of electrons emitted during ion bombardment. An increase in the coefficient of ion-electron emission from a thick film detected by the present authors earlier (DAN UzSSR, 1965, no. 11) is determined by the increase in electron yield with the most probable energy. A decrease in the most probable energy, a simultaneous increase in the total yield with an increase in the thickness of the film, and an absence in the influence of the latter on the maximum energy of secondary electrons are all additional evidence in confirmation of the depth character of ion-electron emission in the region

Card 1/2

L 23755-66

ACC NR: AP6008548

of low energies (potential emission) as well as in the region of relatively high energies (kinetic emission). It is extremely interesting that the energy spectrum of secondary electrons emitted from NaCl is very weakly dependent on the nature and the energy of the bombarding ions. This fact, evidently, is due to the difference in the mechanism of the ion-electron emission from metals and alkali-haloid compound films. Orig. art. has: 4 figures.

SUB CODE: 20 / SUBM DATE: 28Sep65 / ORIG REF: 005 / OTH REF: 003

Card

2/2



L 36352-66 EWT(1)/T IJP(c) AT

ACC NR: AP6017579

SOURCE CODE: UR/0377/65/000/006/0005/0011

AUTHORS: Arifov, U. A. (Academician AN UzSSR); Kulagin, A. I. (Candidate of physico-mathematical sciences) <sup>57B</sup>

ORG: Physicotechnical Institute AN UzSSR (Fiziko-tekhnicheskiy Institut AN UzSSR)

TITLE: Thermoelectric method of converting solar energy into electricity (short review)

SOURCE: Geliotekhnika, no. 6, 1965, 5-11

TOPIC TAGS: thermionic emission, thermoelectric convertor, solar energy conversion

ABSTRACT: The authors review recent work done in the thermionic emission method of converting heat energy into electricity, especially through the use of solar and nuclear energy, since the energy conversion can in this case be carried out in closed volumes and at very low loss, whereas heating with conventional fuel is accompanied by large outward radiation loss. The article deals with the operating principles of such converters, solar energy concentrators, the use of such concentrators on satellites in outer space, certain commercially constructed concentrators in solar concentrators in solar converters, and some published data on their weights and efficiencies. All references are to western sources. Orig. art. has: 3 figures, 2 formulas, and 1 table.

SUB CODE: 20/ SUBM DATE: 16Aug65/ ORIG REF: 005/ OTH REF: 026

Card 1/1

L 23756-66 EWT(1)/EWT(m)/T AT

ACC NR: AP6008549

SOURCE CODE: UR/0166/66/000/001/0057/0061

AUTHOR: Arifov, U.A.; Khadzhimukhamedov, Kh. Kh.; Ayukhanov, A. Kh. 51  
B

ORG: Physics Technical Institute, AN UzSSR (Fiziko-tekhicheskiy institut AN UzSSR)

TITLE: The coefficient of surface ionization of fast secondary particles 2/  
14

SOURCE: AN UzSSR. Izvestiya. Seriya fiziko-matematicheskikh nauk, no. 1, 1966, 57-61

TOPIC TAGS: fast particle, secondary emission, ion bombardment, ion emission, surface ionization

ABSTRACT: After a brief review of the literature, the authors note that there is no clarity in the question on the charge state of fast particles emitted from a surface and on the application of the law of surface ionization to these particles. The present authors together with S.V. Starodubtsev showed earlier (DAN SSSR, 124, 1959, 60) that there are slow (evaporated and diffused) as well as fast (scattered) ions in the secondary ion emission. Experimental work on the charge state of emitted fast particles had been conducted without separating the secondary ions into the individual components. Therefore, the purpose of the present work is the experimental study of the charge state of  
Card 1/2 2

L 23756-66

ACC NR: AP6008549

surface-emitted fast particles depending on the ionization energy and potential of bombarding ions. On the basis of the experimental data obtained in the present work and that of other authors (Flyants, N.N., Arifov, U.A., Ayukhanov, A. Kh. "Radiotekhnika i elektronika," 1963, no. 8, 34; Zandberg, E. Ya. ZhTF, 25, 1955, 1386; Arifov, U.A., Khadzhimukhamedov, Kh. Kh. "Izv. AN SSSR," seria fizich., 24, 1960, 705) it is concluded that the scattering in the form of positive ions depends not on the charge state of the primary particle, but on the ionization potential of the bombarding particle. This process, however, only qualitatively agrees with the mechanisms of surface ionization. This should have been expected, since secondary scattered ions have an entire energy spectrum, from thermal to limiting, determined by single and multiple elastic collisions of the bombarding particle with the atoms of the metal. A better agreement of the results with the surface ionization mechanism may be obtained, apparently, only for the group of slow ions with energies below 10 ev. Orig. art. has: 1 figure and 3 formulas.

SUB CODE: 20 / SUBM DATE: 10Mar65 / ORIG REF: 015 / OTHREF: 001

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L 36325-66 EWT(1)/EWT(m)/EWP(t)/ETI IJP(c) AT/JD/JG

ACC NR: AP6015795

(A,N)

SOURCE CODE: UR/0048/GG/030/005/0896/0900

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ORG: none

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TITLE: Energy distribution of the electrons emitted from the alkali halide under helium and argon ion bombardment /Report, Twelfth All-Union Conference on the Physical Bases of Cathode Electronics held in Leningrad 22-26 October 1965/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 5, 1966. 896-900

TOPIC TAGS: secondary electron emission, energy distribution, alkali halide, thin film, ion bombardment, helium, argon

ABSTRACT: The authors have recorded the energy distribution of secondary electrons emitted under bombardment with 40 to 2000 eV He<sup>+</sup> and Ar<sup>+</sup> ions by NaCl films during their deposition on Mo substrates. The 10<sup>-8</sup> A/cm<sup>2</sup> beam of monoenergetic ions was incident normally on the 23 x 3 x 0.03 mm Mo target, on which there was also incident at 45° a jet of NaCl vapor. Secondary electrons leaving the target at a fixed angle traversed a 5.7 cm radius 127° deflection electrostatic analyzer and were detected with an electron multiplier. A saw tooth potential was applied to the analyzer plates and the energy distribution of the secondary electrons was displayed directly on an oscilloscope screen and was recorded cinematographically. The molybdenum substrate was out-

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